

(1) GENERAL INFORMATION:

- (2) INFORMATION FOR SEQ ID NO: 1:

- ```
(i) SEQUENCE CHARACTERISTICS:
      (A) LENGTH: 792 base pairs
      (B) TYPE: nucleic acid
      (C) STRANDEDNESS: single
      (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)
```

## (ix) FEATURE:

(A) NAME/KEY: CDS

(B) LOCATION: 240..791

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

|                                                                    |     |
|--------------------------------------------------------------------|-----|
| GAATTCCCCC AACAGAGCCA AGCTCTCCAT CTAGTGGACA GGGAAGCTAG CAGCAAACCT  | 60  |
| TCCCTTCACT ACAAACCTTC ATTGCTTGGC CAAAAAGAGA GTTAATTCAA TG TAGACATC | 120 |
| TATGTAGGCA ATTAAAAACC TATTGATGTA TAAAACAGTT TGCATTTCATG GAGGGCAACT | 180 |
| AAATACATTC TAGGACTTTA TAAAAGATCA CTTTTTATTT ATGCACAGGG TGGAACAAG   | 239 |
| ATG GAT TAT CAA GTG TCA AGT CCA ATC TAT GAC ATC AAT TAT TAT ACA    | 287 |
| Met Asp Tyr Gln Val Ser Ser Pro Ile Tyr Asp Ile Asn Tyr Tyr Thr    |     |
| 1 5 10 15                                                          |     |
| TCG GAG CCC TGC CAA AAA ATC AAT GTG AAG CAA ATC GCA GCC CGC CTC    | 335 |
| Ser Glu Pro Cys Gln Lys Ile Asn Val Lys Gln Ile Ala Ala Arg Leu    |     |
| 20 25 30                                                           |     |
| CTG CCT CCG CTC TAC TCA CTG GTG TTC ATC TTT GGT TTT GTG GGC AAC    | 383 |
| Leu Pro Pro Leu Tyr Ser Leu Val Phe Ile Phe Gly Phe Val Gly Asn    |     |
| 35 40 45                                                           |     |
| ATG CTG GTC ATC CTC ATC CTG ATA AAC TGC AAA AGG CTG AAG AGC ATG    | 431 |
| Met Leu Val Ile Leu Ile Leu Ile Asn Cys Lys Arg Leu Lys Ser Met    |     |
| 50 55 60                                                           |     |
| ACT GAC ATC TAC CTG CTC AAC CTG GCC ATC TCT GAC CTG TTT TTC CTT    | 479 |
| Thr Asp Ile Tyr Leu Leu Asn Leu Ala Ile Ser Asp Leu Phe Phe Leu    |     |
| 65 70 75 80                                                        |     |
| CTT ACT GTC CCC TTC TGG GCT CAC TAT GCT GCC GCC CAG TGG GAC TTT    | 527 |
| Leu Thr Val Pro Phe Trp Ala His Tyr Ala Ala Ala Gln Trp Asp Phe    |     |
| 85 90 95                                                           |     |
| GGA AAT ACA ATG TGT CAA CTC TTG ACA GGG CTC TAT TTT ATA GGC TTC    | 575 |
| Gly Asn Thr Met Cys Gln Leu Leu Thr Gly Leu Tyr Phe Ile Gly Phe    |     |
| 100 105 110                                                        |     |
| TTC TCT GGA ATC TTC TTC ATC ATC CTC CTG ACA ATC GAT AGG TAC CTG    | 623 |
| Phe Ser Gly Ile Phe Phe Ile Ile Leu Leu Thr Ile Asp Arg Tyr Leu    |     |
| 115 120 125                                                        |     |
| GCT GTC GTC CAT GCT GTG TTT GCT TTA AAA GCC AGG ACG GTC ACC TTT    | 671 |
| Ala Val Val His Ala Val Phe Ala Leu Lys Ala Arg Thr Val Thr Phe    |     |
| 130 135 140                                                        |     |
| GGG GTG GTG ACA AGT GTG ATC ACT TGG GTG GTG GCT GTG TTT GCG TCT    | 719 |
| Gly Val Val Thr Ser Val Ile Thr Trp Val Val Ala Val Phe Ala Ser    |     |
| 145 150 155 160                                                    |     |
| CTC CCA GGA ATC ATC TTT ACC AGA TCT CAA AAA GAA GGT CTT CAT TAC    | 767 |
| Leu Pro Gly Ile Ile Phe Thr Arg Ser Gln Lys Glu Gly Leu His Tyr    |     |
| 165 170 175                                                        |     |
| ACC TGC AGC TCT CAT TTT CCA TAC A                                  | 792 |
| Thr Cys Ser Ser His Phe Pro Tyr                                    |     |
| 180                                                                |     |

## (2) INFORMATION FOR SEQ ID NO: 2:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1477 base pairs  
 (B) TYPE: nucleic acid  
 (C) STRANDEDNESS: single  
 (D) TOPOLOGY: linear

(ii) MOLECULE TYPE: DNA (genomic)

(ix) FEATURE:

- (A) NAME/KEY: CDS  
 (B) LOCATION: 240..1295

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| GAATTCCCCC AACAGAGCCA AGCTCTCCAT CTAGTGGACA GCGAAGCTAG CAGCAAACCT | 60  |
| TCCCTTCACT ACAAACCTTC ATTGCTTGGC CAAAAGAGA GTTAATTCAA TGTAGACATC  | 120 |
| TATGTAGGCA ATTAATAACC TATTGATGTA TAAACAGTT TGCATTCATG GAGGGCAACT  | 180 |
| AAATACATTC TAGGACTTTA TAAAAGATCA CTTTTTATTT ATGCACAGGG TGGAACAAG  | 239 |
| ATG GAT TAT CAA GTG TCA AGT CCA ATC TAT GAC ATC AAT TAT TAT ACA   | 287 |
| Met Asp Tyr Gln Val Ser Ser Pro Ile Tyr Asp Ile Asn Tyr Tyr Thr   |     |
| 1 5 10 15                                                         |     |
| TCG GAG CCC TGC CAA AAA ATC AAT GTG AAG CAA ATC GCA GCC CGC CTC   | 335 |
| Ser Glu Pro Cys Gln Lys Ile Asn Val Lys Gln Ile Ala Ala Arg Leu   |     |
| 20 25 30                                                          |     |
| CTG CCT CCG CTC TAC TCA CTG GTG TTC ATC TTT GGT TTT GTG GGC AAC   | 383 |
| Leu Pro Pro Leu Tyr Ser Leu Val Phe Ile Phe Gly Phe Val Gly Asn   |     |
| 35 40 45                                                          |     |
| ATG CTG GTC ATC CTC ATC CTG ATA AAC TGC AAA AGG CTG AAG AGC ATG   | 431 |
| Met Leu Val Ile Leu Ile Leu Ile Asn Cys Lys Arg Leu Lys Ser Met   |     |
| 50 55 60                                                          |     |
| ACT GAC ATC TAC CTG CTC AAC CTG GCC ATC TCT GAC CTG TTT TTC CTT   | 479 |
| Thr Asp Ile Tyr Leu Leu Asn Leu Ala Ile Ser Asp Leu Phe Phe Leu   |     |
| 65 70 75 80                                                       |     |
| CTT ACT GTC CCC TTC TGG GCT CAC TAT GCT GCC GCC CAG TGG GAC TTT   | 527 |
| Leu Thr Val Pro Phe Trp Ala His Tyr Ala Ala Ala Gln Trp Asp Phe   |     |
| 85 90 95                                                          |     |
| GGA AAT ACA ATG TGT CAA CTC TTG ACA GGG CTC TAT TTT ATA GGC TTC   | 575 |
| Gly Asn Thr Met Cys Gln Leu Leu Thr Gly Leu Tyr Phe Ile Gly Phe   |     |
| 100 105 110                                                       |     |
| TTC TCT GGA ATC TTC TTC ATC ATC CTC CTG ACA ATC GAT AGG TAC CTG   | 623 |
| Phe Ser Gly Ile Phe Phe Ile Ile Leu Leu Thr Ile Asp Arg Tyr Leu   |     |
| 115 120 125                                                       |     |
| GCT GTC GTC CAT GCT GTG TTT GCT TTA AAA GCC AGG ACG GTC ACC TTT   | 671 |
| Ala Val Val His Ala Val Phe Ala Leu Lys Ala Arg Thr Val Thr Phe   |     |
| 130 135 140                                                       |     |
| GGG GTG GTG ACA AGT GTG ATC ACT TGG GTG GTG GCT GTG TTT GCG TCT   | 719 |
| Gly Val Val Thr Ser Val Ile Thr Trp Val Val Ala Val Phe Ala Ser   |     |
| 145 150 155 160                                                   |     |
| CTC CCA GGA ATC ATC TTT ACC AGA TCT CAA AAA GAA GGT CTT CAT TAC   | 767 |
| Leu Pro Gly Ile Ile Phe Thr Arg Ser Gln Lys Glu Gly Leu His Tyr   |     |
| 165 170 175                                                       |     |

|                                                                   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| ACC                                                               | TGC | AGC | TCT | CAT | TTT | CCA | TAC | AGT | CAG | TAT | CAA | TTC | TGG | AAG | AAT | 815  |
| Thr                                                               | Cys | Ser | Ser | His | Phe | Pro | Tyr | Ser | Gln | Tyr | Gln | Phe | Trp | Lys | Asn |      |
|                                                                   |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |      |
| TTC                                                               | CAG | ACA | TTA | AAG | ATA | GTC | ATC | TTG | GGG | CTG | GTC | CTG | CCG | CTG | CTT | 863  |
| Phe                                                               | Gln | Thr | Leu | Lys | Ile | Val | Ile | Leu | Gly | Leu | Val | Leu | Pro | Leu | Leu |      |
|                                                                   |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |      |
| GTC                                                               | ATG | GTC | ATC | TGC | TAC | TCG | GGA | ATC | CTA | AAA | ACT | CTG | CTT | CGG | TGT | 911  |
| Val                                                               | Met | Val | Ile | Cys | Tyr | Ser | Gly | Ile | Leu | Lys | Thr | Leu | Leu | Arg | Cys |      |
|                                                                   | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |      |
| CGA                                                               | AAT | GAG | AAG | AAG | AGG | CAC | AGG | GCT | GTG | AGG | CTT | ATC | TTC | ACC | ATC | 959  |
| Arg                                                               | Asn | Glu | Lys | Lys | Arg | His | Arg | Ala | Val | Arg | Leu | Ile | Phe | Thr | Ile |      |
| 225                                                               |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |      |
| ATG                                                               | ATT | GTT | TAT | TTT | CTC | TTC | TGG | GCT | CCC | TAC | AAC | ATT | GTC | CTT | CTC | 1007 |
| Met                                                               | Ile | Val | Tyr | Phe | Leu | Phe | Trp | Ala | Pro | Tyr | Asn | Ile | Val | Leu | Leu |      |
|                                                                   |     |     | 245 |     |     |     |     | 250 |     |     |     |     |     | 255 |     |      |
| CTG                                                               | AAC | ACC | TTC | CAG | GAA | TTC | TTT | GGC | CTG | AAT | AAT | TGC | AGT | AGC | TCT | 1055 |
| Leu                                                               | Asn | Thr | Phe | Gln | Glu | Phe | Phe | Gly | Leu | Asn | Asn | Cys | Ser | Ser | Ser |      |
|                                                                   |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |      |
| AAC                                                               | AGG | TTG | GAC | CAA | GCT | ATG | CAG | GTG | ACA | GAG | ACT | CTT | GGG | ATG | ACG | 1103 |
| Asn                                                               | Arg | Leu | Asp | Gln | Ala | Met | Gln | Val | Thr | Glu | Thr | Leu | Gly | Met | Thr |      |
|                                                                   |     | 275 |     |     |     | 280 |     |     |     |     |     | 285 |     |     |     |      |
| CAC                                                               | TGC | TGC | ATC | AAC | CCC | ATC | ATC | TAT | GCC | TTT | GTC | GGG | GAG | AAG | TTC | 1151 |
| His                                                               | Cys | Cys | Ile | Asn | Pro | Ile | Ile | Tyr | Ala | Phe | Val | Gly | Glu | Lys | Phe |      |
|                                                                   | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |      |
| AGA                                                               | AAC | TAC | CTC | TTA | GTC | TTC | TTC | CAA | AAG | CAC | ATT | GCC | AAA | CGC | TTC | 1199 |
| Arg                                                               | Asn | Tyr | Leu | Leu | Val | Phe | Phe | Gln | Lys | His | Ile | Ala | Lys | Arg | Phe |      |
|                                                                   | 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |      |
| TGC                                                               | AAA | TGC | TGT | TCT | ATT | TTC | CAG | CAA | GAG | GCT | CCC | GAG | CGA | GCA | AGC | 1247 |
| Cys                                                               | Lys | Cys | Cys | Ser | Ile | Phe | Gln | Gln | Glu | Ala | Pro | Glu | Arg | Ala | Ser |      |
|                                                                   |     |     |     | 325 |     |     |     | 330 |     |     |     |     |     | 335 |     |      |
| TCA                                                               | GTT | TAC | ACC | CGA | TCC | ACT | GGG | GAG | CAG | GAA | ATA | TCT | GTG | GGC | TTG | 1295 |
| Ser                                                               | Val | Tyr | Thr | Arg | Ser | Thr | Gly | Glu | Gln | Glu | Ile | Ser | Val | Gly | Leu |      |
|                                                                   |     |     | 340 |     |     |     | 345 |     |     |     |     |     | 350 |     |     |      |
| TGACACGGAC TCAAGTGGGC TGGTGACCCA GTCAGAGTTG TGCACATGGC TTAGTTTTCA |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1355 |
| TACACAGCCT GGGCTGGGGG TNGGTTGGNN GAGGTCTTTT TTAAGAGGAA GTTACTGTTA |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1415 |
| TAGAGGGTCT AAGATTCATC CATTTATTTG GCATCTGTTT AAAGTAGATT AGATCCGAAT |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1475 |
| TC                                                                |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | 1477 |

## (2) INFORMATION FOR SEQ ID NO: 3:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1442 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: DNA (genomic)

## (ix) FEATURE:

- (A) NAME/KEY: CDS

|                                                                   |            |             |            |             |            |            |  |     |
|-------------------------------------------------------------------|------------|-------------|------------|-------------|------------|------------|--|-----|
| GAATTC                                                            | CCCC       | AACAGAGCCCA | AGCTCTCCAT | CTAGTGGACA  | GGGAAGCTAG | CAGCAAACCT |  | 60  |
| TCCCTT                                                            | CACT       | ACAAAACCTTC | ATTGCTTGGC | CAAAAAAGAGA | GTTAATTCAA | TGTAGACATC |  | 120 |
| TATGTAGGCA                                                        | ATTAAAAACC | TATTGATGTA  | TAAAACAGTT | TGCATTTCATG | GAGGGCAACT |            |  | 180 |
| AAATACATTC                                                        | TAGGACTTTA | TAAAAGATCA  | CTTTTTATTT | ATGCACAGGG  | TGGAACAAG  |            |  | 239 |
| ATG GAT TAT CAA GTG TCA AGT CCA ATC TAT GAC ATC AAT TAT TAT ACA   |            |             |            |             |            |            |  | 287 |
| Met Asp Tyr Gln Val Ser Ser Pro Ile Tyr Asp Ile Asn Tyr Tyr Thr   |            |             |            |             |            |            |  |     |
| 1 5 10 15                                                         |            |             |            |             |            |            |  |     |
| TCG GAG CCC TGC CAA AAA ATC AAT GTG AAG CAA ATC GCA GCC CGC CTC   |            |             |            |             |            |            |  | 335 |
| Ser Glu Pro Cys Gln Lys Ile Asn Val Lys Gln Ile Ala Ala Arg Leu   |            |             |            |             |            |            |  |     |
| 20 25 30                                                          |            |             |            |             |            |            |  |     |
| CTG CCT CCG CTC TAC TCA CTG GTG TTC ATC TTT GGT TTT GTG GGC AAC   |            |             |            |             |            |            |  | 383 |
| Leu Pro Pro Leu Tyr Ser Leu Val Phe Ile Phe Gly Phe Val Gly Asn   |            |             |            |             |            |            |  |     |
| 35 40 45                                                          |            |             |            |             |            |            |  |     |
| ATG CTG GTC ATC CTC ATC CTG ATA AAC TGC AAA AGG CTG AAG AGC ATG   |            |             |            |             |            |            |  | 431 |
| Met Leu Val Ile Leu Ile Leu Ile Asn Cys Lys Arg Leu Lys Ser Met   |            |             |            |             |            |            |  |     |
| 50 55 60                                                          |            |             |            |             |            |            |  |     |
| ACT GAC ATC TAC CTG CTC AAC CTG GCC ATC TCT GAC CTG TTT TTC CTT   |            |             |            |             |            |            |  | 479 |
| Thr Asp Ile Tyr Leu Leu Asn Leu Ala Ile Ser Asp Leu Phe Phe Leu   |            |             |            |             |            |            |  |     |
| 65 70 75 80                                                       |            |             |            |             |            |            |  |     |
| CTT ACT GTC CCC TTC TGG GCT CAC TAT GCT GCC GCC CAG TGG GAC TTT   |            |             |            |             |            |            |  | 527 |
| Leu Thr Val Pro Phe Trp Ala His Tyr Ala Ala Ala Gln Trp Asp Phe   |            |             |            |             |            |            |  |     |
| 85 90 95                                                          |            |             |            |             |            |            |  |     |
| GGA AAT ACA ATG TGT CAA CTC TTG ACA GGG CTC TAT TTT ATA GGC TTC   |            |             |            |             |            |            |  | 575 |
| Gly Asn Thr Met Cys Gln Leu Leu Thr Gly Leu Tyr Phe Ile Gly Phe   |            |             |            |             |            |            |  |     |
| 100 105 110                                                       |            |             |            |             |            |            |  |     |
| TTC TCT GGA ATC TTC TTC ATC ATC CTC CTG ACA ATC GAT AGG TAC CTG   |            |             |            |             |            |            |  | 623 |
| Phe Ser Gly Ile Phe Phe Ile Ile Leu Leu Thr Ile Asp Arg Tyr Leu   |            |             |            |             |            |            |  |     |
| 115 120 125                                                       |            |             |            |             |            |            |  |     |
| GCT GTC GTC CAT GCT GTG TTT GCT TTA AAA GCC AGG ACG GTC ACC TTT   |            |             |            |             |            |            |  | 671 |
| Ala Val Val His Ala Val Phe Ala Leu Lys Ala Arg Thr Val Thr Phe   |            |             |            |             |            |            |  |     |
| 130 135 140                                                       |            |             |            |             |            |            |  |     |
| GGG GTG GTG ACA AGT GTG ATC ACT TGG GTG GTG GCT GTG TTT GCG TCT   |            |             |            |             |            |            |  | 719 |
| Gly Val Val Thr Ser Val Ile Thr Trp Val Val Ala Val Phe Ala Ser   |            |             |            |             |            |            |  |     |
| 145 150 155 160                                                   |            |             |            |             |            |            |  |     |
| CTC CCA GGA ATC ATC TTT ACC AGA TCT CAA AAA GAA GGT CTT CAT TAC   |            |             |            |             |            |            |  | 767 |
| Leu Pro Gly Ile Ile Phe Thr Arg Ser Gln Lys Glu Gly Leu His Tyr   |            |             |            |             |            |            |  |     |
| 165 170 175                                                       |            |             |            |             |            |            |  |     |
| ACC TGC AGC TCT CAT TTT CCA TAC ATT AAA GAT AGT CAT CTT GGG GCT   |            |             |            |             |            |            |  | 815 |
| Thr Cys Ser Ser His Phe Pro Tyr Ile Lys Asp Ser His Leu Gly Ala   |            |             |            |             |            |            |  |     |
| 180 185 190                                                       |            |             |            |             |            |            |  |     |
| GGT CCT GCC GCT GCT TGT CAT GGT CAT CTG CTA CTC GGG AAT CCT AAA   |            |             |            |             |            |            |  | 863 |
| Gly Pro Ala Ala Ala Cys His Gly His Leu Leu Leu Gly Asn Pro Lys   |            |             |            |             |            |            |  |     |
| 195 200 205                                                       |            |             |            |             |            |            |  |     |
| AAC TCT GCT TCG GTG TCG AAA TGAGAAGAAG AGGCACAGGG CTGTGAGGCT      |            |             |            |             |            |            |  | 914 |
| Asn Ser Ala Ser Val Ser Lys                                       |            |             |            |             |            |            |  |     |
| 210 215                                                           |            |             |            |             |            |            |  |     |
| TATCTTCACC ATCATGATTG TTTATTTTCT CTTCTGGGCT CCCTACAACA TTGTCCTTCT |            |             |            |             |            |            |  | 974 |

|            |            |            |            |             |            |      |
|------------|------------|------------|------------|-------------|------------|------|
| CCTGAACACC | TTCCAGGAAT | TCTTTGGCCT | GAATAATTGC | AGTAGCTCTA  | ACAGGTTGGA | 1034 |
| CCAAGCTATG | CAGGTGACAG | AGACTCTTGG | GATGACGCAC | TGCTGCATCA  | ACCCCATCAT | 1094 |
| CTATGCCTTT | GTCGGGGAGA | AGTTCAGAAA | CTACCTCTTA | GTCTTCTTCC  | AAAAGCACAT | 1154 |
| TGCCAAACGC | TTCTGCAAAT | GCTGTTCTAT | TTTCCAGCAA | GAGGCTCCCG  | AGCGAGCAAG | 1214 |
| CTCAGTTTAC | ACCCGATCCA | CTGGGGAGCA | GGAAATATCT | GTGGGCTTGT  | GACACGGACT | 1274 |
| CAAGTGGGCT | GGTGACCCAG | TCAGAGTTGT | GCACATGGCT | TAGTTTTTCAT | ACACAGCCTG | 1334 |
| GGCTGGGGGT | GGTTGGGAGG | TCTTTTTTAA | AAGGAAGTTA | CTGTTATAGA  | GGGTCTAAGA | 1394 |
| TTCATCCATT | TATTTGGCAT | CTGTTTAAAG | TAGATTAGAT | CCGAATTC    |            | 1442 |

## (2) INFORMATION FOR SEQ ID NO: 4:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 184 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

ii) MOLECULE TYPE: protein

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 4:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asp | Tyr | Gln | Val | Ser | Ser | Pro | Ile | Tyr | Asp | Ile | Asn | Tyr | Tyr | Thr | 1   | 5   | 10  | 15  |
| Ser | Glu | Pro | Cys | Gln | Lys | Ile | Asn | Val | Lys | Gln | Ile | Ala | Ala | Arg | Leu | 20  | 25  | 30  |     |
| Leu | Pro | Pro | Leu | Tyr | Ser | Leu | Val | Phe | Ile | Phe | Gly | Phe | Val | Gly | Asn | 35  | 40  | 45  |     |
| Met | Leu | Val | Ile | Leu | Ile | Leu | Ile | Asn | Cys | Lys | Arg | Leu | Lys | Ser | Met | 50  | 55  | 60  |     |
| Thr | Asp | Ile | Tyr | Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp | Leu | Phe | Phe | Leu | 65  | 70  | 75  | 80  |
| Leu | Thr | Val | Pro | Phe | Trp | Ala | His | Tyr | Ala | Ala | Ala | Gln | Trp | Asp | Phe | 85  | 90  | 95  |     |
| Gly | Asn | Thr | Met | Cys | Gln | Leu | Leu | Thr | Gly | Leu | Tyr | Phe | Ile | Gly | Phe | 100 | 105 | 110 |     |
| Phe | Ser | Gly | Ile | Phe | Phe | Ile | Ile | Leu | Leu | Thr | Ile | Asp | Arg | Tyr | Leu | 115 | 120 | 125 |     |
| Ala | Val | Val | His | Ala | Val | Phe | Ala | Leu | Lys | Ala | Arg | Thr | Val | Thr | Phe | 130 | 135 | 140 |     |
| Gly | Val | Val | Thr | Ser | Val | Ile | Thr | Trp | Val | Val | Ala | Val | Phe | Ala | Ser | 145 | 150 | 155 | 160 |
| Leu | Pro | Gly | Ile | Ile | Phe | Thr | Arg | Ser | Gln | Lys | Glu | Gly | Leu | His | Tyr | 165 | 170 | 175 |     |
| Thr | Cys | Ser | Ser | His | Phe | Pro | Tyr |     |     |     |     |     |     |     |     | 180 |     |     |     |

## (2) INFORMATION FOR SEQ ID NO: 5:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 352 amino acids
- (B) TYPE: amino acid

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: protein

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 5:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asp | Tyr | Gln | Val | Ser | Ser | Pro | Ile | Tyr | Asp | Ile | Asn | Tyr | Tyr | Thr |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ser | Glu | Pro | Cys | Gln | Lys | Ile | Asn | Val | Lys | Gln | Ile | Ala | Ala | Arg | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Leu | Pro | Pro | Leu | Tyr | Ser | Leu | Val | Phe | Ile | Phe | Gly | Phe | Val | Gly | Asn |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Met | Leu | Val | Ile | Leu | Ile | Leu | Ile | Asn | Cys | Lys | Arg | Leu | Lys | Ser | Met |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Thr | Asp | Ile | Tyr | Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp | Leu | Phe | Phe | Leu |
|     | 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Leu | Thr | Val | Pro | Phe | Trp | Ala | His | Tyr | Ala | Ala | Ala | Gln | Trp | Asp | Phe |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Gly | Asn | Thr | Met | Cys | Gln | Leu | Leu | Thr | Gly | Leu | Tyr | Phe | Ile | Gly | Phe |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Phe | Ser | Gly | Ile | Phe | Phe | Ile | Ile | Leu | Leu | Thr | Ile | Asp | Arg | Tyr | Leu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Ala | Val | Val | His | Ala | Val | Phe | Ala | Leu | Lys | Ala | Arg | Thr | Val | Thr | Phe |
|     | 130 |     |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |
| Gly | Val | Val | Thr | Ser | Val | Ile | Thr | Trp | Val | Val | Ala | Val | Phe | Ala | Ser |
|     | 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Leu | Pro | Gly | Ile | Ile | Phe | Thr | Arg | Ser | Gln | Lys | Glu | Gly | Leu | His | Tyr |
|     |     |     |     | 165 |     |     |     | 170 |     |     |     |     |     | 175 |     |
| Thr | Cys | Ser | Ser | His | Phe | Pro | Tyr | Ser | Gln | Tyr | Gln | Phe | Trp | Lys | Asn |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Phe | Gln | Thr | Leu | Lys | Ile | Val | Ile | Leu | Gly | Leu | Val | Leu | Pro | Leu | Leu |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Val | Met | Val | Ile | Cys | Tyr | Ser | Gly | Ile | Leu | Lys | Thr | Leu | Leu | Arg | Cys |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Arg | Asn | Glu | Lys | Lys | Arg | His | Arg | Ala | Val | Arg | Leu | Ile | Phe | Thr | Ile |
|     | 225 |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Met | Ile | Val | Tyr | Phe | Leu | Phe | Trp | Ala | Pro | Tyr | Asn | Ile | Val | Leu | Leu |
|     |     |     |     | 245 |     |     |     | 250 |     |     |     |     |     | 255 |     |
| Leu | Asn | Thr | Phe | Gln | Glu | Phe | Phe | Gly | Leu | Asn | Asn | Cys | Ser | Ser | Ser |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Asn | Arg | Leu | Asp | Gln | Ala | Met | Gln | Val | Thr | Glu | Thr | Leu | Gly | Met | Thr |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| His | Cys | Cys | Ile | Asn | Pro | Ile | Ile | Tyr | Ala | Phe | Val | Gly | Glu | Lys | Phe |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Arg | Asn | Tyr | Leu | Leu | Val | Phe | Phe | Gln | Lys | His | Ile | Ala | Lys | Arg | Phe |
|     | 305 |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Cys | Lys | Cys | Cys | Ser | Ile | Phe | Gln | Gln | Glu | Ala | Pro | Glu | Arg | Ala | Ser |
|     |     |     |     | 325 |     |     |     | 330 |     |     |     |     |     | 335 |     |
| Ser | Val | Tyr | Thr | Arg | Ser | Thr | Gly | Glu | Gln | Glu | Ile | Ser | Val | Gly | Leu |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |

## (2) INFORMATION FOR SEQ ID NO: 6:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 215 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: protein

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO: 6:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asp | Tyr | Gln | Val | Ser | Ser | Pro | Ile | Tyr | Asp | Ile | Asn | Tyr | Tyr | Thr |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     | 15  |     |     |
| Ser | Glu | Pro | Cys | Gln | Lys | Ile | Asn | Val | Lys | Gln | Ile | Ala | Ala | Arg | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     | 30  |     |     |     |
| Leu | Pro | Pro | Leu | Tyr | Ser | Leu | Val | Phe | Ile | Phe | Gly | Phe | Val | Gly | Asn |
|     |     | 35  |     |     |     |     | 40  |     |     |     | 45  |     |     |     |     |
| Met | Leu | Val | Ile | Leu | Ile | Leu | Ile | Asn | Cys | Lys | Arg | Leu | Lys | Ser | Met |
|     | 50  |     |     |     | 55  |     |     |     |     |     | 60  |     |     |     |     |
| Thr | Asp | Ile | Tyr | Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp | Leu | Phe | Phe | Leu |
| 65  |     |     |     | 70  |     |     |     |     |     | 75  |     |     |     |     | 80  |
| Leu | Thr | Val | Pro | Phe | Trp | Ala | His | Tyr | Ala | Ala | Ala | Gln | Trp | Asp | Phe |
|     |     |     | 85  |     |     |     |     |     | 90  |     |     |     | 95  |     |     |
| Gly | Asn | Thr | Met | Cys | Gln | Leu | Leu | Thr | Gly | Leu | Tyr | Phe | Ile | Gly | Phe |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     | 110 |     |     |     |
| Phe | Ser | Gly | Ile | Phe | Phe | Ile | Ile | Leu | Leu | Thr | Ile | Asp | Arg | Tyr | Leu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Ala | Val | Val | His | Ala | Val | Phe | Ala | Leu | Lys | Ala | Arg | Thr | Val | Thr | Phe |
|     |     | 130 |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Gly | Val | Val | Thr | Ser | Val | Ile | Thr | Trp | Val | Val | Ala | Val | Phe | Ala | Ser |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Leu | Pro | Gly | Ile | Ile | Phe | Thr | Arg | Ser | Gln | Lys | Glu | Gly | Leu | His | Tyr |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Thr | Cys | Ser | Ser | His | Phe | Pro | Tyr | Ile | Lys | Asp | Ser | His | Leu | Gly | Ala |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Gly | Pro | Ala | Ala | Ala | Cys | His | Gly | His | Leu | Leu | Leu | Gly | Asn | Pro | Lys |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Asn | Ser | Ala | Ser | Val | Ser | Lys |     |     |     |     |     |     |     |     |     |
|     | 210 |     |     |     |     | 215 |     |     |     |     |     |     |     |     |     |

## (2) INFORMATION FOR SEQ ID NO:7:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 360 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: None

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Leu | Ser | Thr | Ser | Arg | Ser | Arg | Phe | Ile | Arg | Asn | Thr | Asn | Glu | Ser |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Gly | Glu | Glu | Val | Thr | Thr | Phe | Phe | Asp | Tyr | Asp | Tyr | Gly | Ala | Pro | Cys |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| His | Lys | Phe | Asp | Val | Lys | Gln | Ile | Gly | Ala | Gln | Leu | Leu | Pro | Pro | Leu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Tyr | Ser | Leu | Val | Phe | Ile | Phe | Gly | Phe | Val | Gly | Asn | Met | Leu | Val | Val |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Leu | Ile | Leu | Ile | Asn | Cys | Lys | Lys | Leu | Lys | Cys | Leu | Thr | Asp | Ile | Tyr |
| 65  |     |     |     | 70  |     |     |     |     |     | 75  |     |     |     | 80  |     |
| Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp | Leu | Leu | Phe | Ile | Ile | Thr | Leu | Pro |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Leu | Trp | Ala | His | Ser | Ala | Ala | Asn | Glu | Trp | Val | Phe | Gly | Asn | Ala | Met |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Cys | Lys | Leu | Phe | Thr | Gly | Leu | Tyr | His | Ile | Gly | Tyr | Phe | Gly | Gly | Ile |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Phe | Phe | Ile | Ile | Leu | Leu | Thr | Ile | Asp | Arg | Tyr | Leu | Ala | Ile | Val | His |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ala | Val | Phe | Ala | Leu | Lys | Ala | Arg | Thr | Val | Thr | Phe | Gly | Val | Val | Thr |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     |     | 160 |
| Ser | Val | Ile | Thr | Trp | Leu | Val | Ala | Val | Phe | Ala | Ser | Val | Pro | Gly | Ile |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Ile | Phe | Thr | Lys | Cys | Gln | Lys | Glu | Asp | Ser | Val | Tyr | Val | Cys | Gly | Pro |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Tyr | Phe | Pro | Arg | Gly | Trp | Asn | Asn | Phe | His | Thr | Ile | Met | Arg | Asn | Ile |
|     |     | 195 |     |     |     | 200 |     |     |     |     |     | 205 |     |     |     |
| Leu | Gly | Leu | Val | Leu | Pro | Leu | Leu | Ile | Met | Val | Ile | Cys | Tyr | Ser | Gly |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Ile | Leu | Lys | Thr | Leu | Leu | Arg | Cys | Arg | Asn | Glu | Lys | Lys | Arg | His | Arg |
| 225 |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     |     | 240 |
| Ala | Val | Arg | Val | Ile | Phe | Thr | Ile | Met | Ile | Val | Tyr | Phe | Leu | Phe | Trp |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Thr | Pro | Tyr | Asn | Ile | Val | Ile | Leu | Leu | Asn | Thr | Phe | Gln | Glu | Phe | Phe |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Gly | Leu | Ser | Asn | Cys | Glu | Ser | Thr | Ser | Gln | Leu | Asp | Gln | Ala | Ile | Gln |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Val | Thr | Glu | Thr | Leu | Gly | Met | Thr | His | Cys | Cys | Ile | Asn | Pro | Ile | Ile |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Tyr | Ala | Phe | Val | Gly | Glu | Lys | Phe | Arg | Arg | Tyr | Ile | Ser | Val | Phe | Phe |
| 305 |     |     |     | 310 |     |     |     |     |     | 315 |     |     |     |     | 320 |
| Arg | Lys | His | Ile | Xaa | Xaa | Xaa | Phe | Cys | Lys | Gln | Cys | Pro | Val | Phe | Tyr |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Arg | Glu | Thr | Val | Asp | Gly | Val | Thr | Ser | Thr | Asn | Thr | Pro | Ser | Thr | Gly |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Glu | Gln | Glu | Val | Ser | Ala | Gly | Leu |     |     |     |     |     |     |     |     |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     |     |     |     |     |

## (2) INFORMATION FOR SEQ ID NO:8:

## (i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 355 amino acids

(B) TYPE: amino acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(ii) MOLECULE TYPE: None

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Thr | Thr | Ser | Ile | Asp | Thr | Val | Glu | Thr | Phe | Gly | Thr | Thr | Ser | Tyr |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |
| Tyr | Asp | Asp | Val | Gly | Leu | Leu | Cys | Glu | Lys | Ala | Asp | Thr | Arg | Ala | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Met | Ala | Gln | Phe | Val | Pro | Pro | Leu | Tyr | Ser | Leu | Val | Phe | Thr | Val | Gly |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Leu | Ile | Gly | Asn | Val | Val | Val | Val | Met | Ile | Leu | Ile | Lys | Tyr | Arg | Arg |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ile | Arg | Ile | Met | Thr | Asn | Ile | Tyr | Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Leu | Leu | Phe | Ile | Val | Thr | Leu | Pro | Phe | Trp | Thr | His | Tyr | Val | Arg | Gly |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| His | Asn | Trp | Val | Phe | Gly | His | Gly | Met | Cys | Asn | Leu | Ile | Ser | Gly | Phe |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Tyr | His | Thr | Gly | Leu | Tyr | Ser | Glu | Ile | Phe | Phe | Ile | Ile | Leu | Leu | Thr |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Ile | Asp | Arg | Tyr | Leu | Ala | Ile | Val | His | Ala | Val | Phe | Ala | Ile | Arg | Ala |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Arg | Thr | Val | Thr | Phe | Gly | Val | Ile | Thr | Ser | Ile | Val | Thr | Trp | Gly | Ile |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     | 160 |     |
| Ala | Val | Ile | Ala | Ala | Leu | Pro | Glu | Phe | Ile | Phe | Tyr | Glu | Thr | Glu | Glu |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Leu | Phe | Glu | Glu | Thr | Ile | Cys | Ser | Ala | Leu | Tyr | Pro | Glu | Asp | Thr | Val |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Tyr | Ser | Trp | Arg | His | Phe | His | Thr | Ile | Arg | Met | Thr | Ile | Phe | Cys | Leu |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Val | Leu | Pro | Leu | Leu | Val | Met | Ala | Ile | Cys | Tyr | Thr | Gly | Ile | Ile | Lys |
|     | 210 |     |     |     |     | 215 |     |     |     |     |     | 220 |     |     |     |
| Thr | Leu | Leu | Arg | Cys | Pro | Xaa | Xaa | Xaa | Lys | Tyr | Lys | Ala | Ile | Arg | Leu |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     | 240 |     |
| Ile | Phe | Val | Ile | Met | Ala | Val | Phe | Phe | Ile | Glu | Trp | Thr | Pro | Tyr | Asn |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Val | Ala | Ile | Leu | Ile | Ser | Ser | Tyr | Gln | Ser | Leu | Leu | Phe | Gly | Asn | Asn |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Cys | Glu | Arg | Ser | Lys | His | Leu | Asp | Leu | Val | Met | Ile | Val | Thr | Glu | Val |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Ile | Ala | Tyr | Ser | His | Cys | Cys | Met | Asn | Glu | Val | Ile | Tyr | Ala | Phe | Val |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Gly | Glu | Arg | Phe | Arg | Lys | Tyr | Ile | Arg | His | Phe | Phe | His | Arg | His | Leu |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     | 320 |     |
| Leu | Met | His | Leu | Gly | Arg | Tyr | Ile | Pro | Phe | Leu | Pro | Xaa | Xaa | Xaa | Ile |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Glu | Arg | Ile | Ser | Ser | Val | Ser | Pro | Ser | Thr | Ala | Glu | Pro | Glu | Ile | Ser |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Ile |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

355

## (2) INFORMATION FOR SEQ ID NO:9:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 355 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: None

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Glu | Thr | Pro | Asn | Thr | Thr | Glu | Asp | Tyr | Asp | Thr | Thr | Thr | Glu | Phe | 1   | 5   | 10  | 15  |
| Asp | Tyr | Gly | Asp | Ala | Thr | Pro | Cys | Gln | Lys | Val | Asn | Glu | Arg | Ala | Phe | 20  | 25  | 30  |     |
| Gly | Ala | Gln | Leu | Leu | Pro | Pro | Leu | Tyr | Ser | Leu | Val | Phe | Val | Ile | Gly | 35  | 40  | 45  |     |
| Leu | Val | Gly | Asn | Ile | Leu | Val | Val | Leu | Val | Leu | Val | Gln | Tyr | Lys | Arg | 50  | 55  | 60  |     |
| Leu | Lys | Asn | Met | Thr | Ser | Ile | Tyr | Leu | Leu | Asn | Leu | Ala | Ile | Ser | Asp | 65  | 70  | 75  | 80  |
| Leu | Leu | Phe | Ile | Phe | Thr | Leu | Pro | Phe | Trp | Ile | Asp | Tyr | Lys | Leu | Lys | 85  | 90  | 95  |     |
| Asp | Asp | Trp | Val | Phe | Gly | Asp | Ala | Met | Cys | Lys | Ile | Ile | Ser | Gly | Phe | 100 | 105 | 110 |     |
| Tyr | Tyr | Thr | Gly | Leu | Tyr | Ser | Glu | Ile | Phe | Phe | Ile | Ile | Leu | Leu | Thr | 115 | 120 | 125 |     |
| Ile | Asp | Arg | Tyr | Leu | Ala | Ile | Val | His | Ala | Val | Phe | Ala | Ile | Arg | Ala | 130 | 135 | 140 |     |
| Arg | Thr | Val | Thr | Phe | Gly | Val | Ile | Thr | Ser | Ile | Ile | Ile | Trp | Ala | Ile | 145 | 150 | 155 | 160 |
| Ala | Ile | Ile | Ala | Ser | Met | Pro | Gly | Leu | Tyr | Phe | Ser | Lys | Thr | Gln | Trp | 165 | 170 | 175 |     |
| Glu | Phe | Thr | His | His | Thr | Cys | Ser | Leu | His | Phe | Pro | His | Glu | Ser | Leu | 180 | 185 | 190 |     |
| Arg | Glu | Trp | Lys | Leu | Phe | Gln | Ala | Leu | Lys | Leu | Asn | Leu | Phe | Gly | Leu | 195 | 200 | 205 |     |
| Val | Leu | Pro | Leu | Leu | Val | Met | Ile | Ile | Cys | Tyr | Ile | Gly | Ile | Ile | Lys | 210 | 215 | 220 |     |
| Ile | Leu | Leu | Arg | Arg | Pro | Asn | Glu | Lys | Lys | Ser | Lys | Ala | Val | Arg | Leu | 225 | 230 | 235 | 240 |
| Ile | Phe | Val | Ile | Met | Ile | Ile | Phe | Phe | Leu | Phe | Trp | Ile | Pro | Tyr | Asn | 245 | 250 | 255 |     |
| Leu | Thr | Ile | Ile | Ile | Ser | Val | Phe | Gln | Asp | Phe | Leu | Phe | Thr | His | Glu | 260 | 265 | 270 |     |
| Cys | Glu | Gln | Ser | Arg | His | Leu | Asp | Leu | Ala | Val | Gln | Val | Thr | Glu | Val | 275 | 280 | 285 |     |
| Ile | Ala | Tyr | Thr | His | Cys | Cys | Val | Asn | Glu | Val | Ile | Tyr | Ala | Phe | Val | 290 | 295 | 300 |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Glu | Arg | Phe | Arg | Lys | Tyr | Ile | Arg | Gln | Leu | Glu | His | Arg | Arg | Val |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Ala | Val | His | Leu | Val | Lys | Trp | Leu | Pro | Phe | Leu | Ser | Val | Asp | Arg | Ile |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Glu | Arg | Val | Ser | Ser | Thr | Ser | Pro | Ser | Thr | Gly | Glu | His | Glu | Ile | Ser |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Ala | Gly | Phe |     |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     | 355 |     |     |     |     |     |     |     |     |     |     |     |     |     |

## (2) INFORMATION FOR SEQ ID NO:10:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 360 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (ii) MOLECULE TYPE: None

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Asn | Pro | Thr | Asp | Ile | Ala | Asp | Thr | Thr | Leu | Asp | Glu | Ser | Ile | Tyr |
|     |     |     | 5   |     |     |     |     | 10  |     |     |     |     |     | 15  |     |
| Ser | Asn | Tyr | Tyr | Leu | Tyr | Glu | Ser | Ile | Pro | Lys | Pro | Cys | Thr | Lys | Glu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Gly | Ile | Lys | Ala | Phe | Gly | Glu | Leu | Phe | Leu | Pro | Pro | Leu | Tyr | Ser | Leu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Val | Glu | Val | Phe | Gly | Leu | Ile | Gly | Asn | Ser | Val | Val | Val | Leu | Val | Leu |
|     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| Phe | Lys | Tyr | Lys | Arg | Ile | Arg | Ser | Met | Thr | Asp | Val | Tyr | Leu | Leu | Asn |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Leu | Ala | Ile | Ser | Asp | Leu | Leu | Phe | Val | Phe | Ser | Leu | Pro | Phe | Trp | Gly |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Tyr | Tyr | Ala | Ala | Asp | Gln | Trp | Val | Phe | Gly | Leu | Gly | Ile | Cys | Lys | Met |
|     |     | 100 |     |     |     |     | 105 |     |     |     |     |     | 110 |     |     |
| Ile | Ser | Trp | Met | Tyr | Leu | Val | Gly | Phe | Tyr | Ser | Gly | Ile | Phe | Phe | Val |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Met | Ile | Met | Ser | Ile | Asp | Arg | Tyr | Leu | Ala | Ile | Val | His | Ala | Val | Glu |
|     | 130 |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |     |
| Xaa | Xaa | Xaa | Ala | Arg | Thr | Ile | Ile | Tyr | Gly | Val | Ile | Thr | Ser | Leu | Ala |
| 145 |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |     |
| Thr | Trp | Ser | Val | Ala | Val | Phe | Ala | Ser | Leu | Pro | Gly | Phe | Ile | Phe | Ser |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |
| Thr | Cys | Tyr | Thr | Glu | Arg | Asn | His | Thr | Tyr | Cys | Lys | Thr | Lys | Tyr | Ser |
|     |     | 180 |     |     |     |     | 185 |     |     |     |     |     | 190 |     |     |
| Leu | Asn | Ser | Thr | Thr | Trp | Lys | Val | Leu | Ser | Ser | Leu | Glu | Ile | Asn | Ile |
|     |     | 195 |     |     |     | 200 |     |     |     |     |     | 205 |     |     |     |
| Leu | Gly | Leu | Val | Ile | Pro | Leu | Gly | Ile | Met | Leu | Phe | Cys | Tyr | Ser | Met |
|     | 210 |     |     |     |     | 215 |     |     |     | 220 |     |     |     |     |     |
| Ile | Ile | Arg | Thr | Leu | Gln | His | Cys | Lys | Asn | Glu | Lys | Lys | Asn | Lys | Ala |
| 225 |     |     |     | 230 |     |     |     |     |     | 235 |     |     |     |     | 240 |
| Val | Lys | Met | Ile | Phe | Ala | Val | Val | Val | Leu | Phe | Leu | Gly | Phe | Trp | Thr |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Tyr | Asn | Ile | Val | Leu | Phe | Leu | Glu | Thr | Leu | Val | Glu | Leu | Glu | Val |
|     |     |     | 245 |     |     |     |     | 250 |     |     |     |     |     | 255 |     |
| Ile | Gln | Asp | Cys | Thr | Phe | Glu | Arg | Tyr | Leu | Asp | Tyr | Ala | Ile | Gln | Ala |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Thr | Glu | Thr | Leu | Ala | Phe | Val | His | Cys | Cys | Leu | Asn | Pro | Ile | Ile | Tyr |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Phe | Phe | Leu | Gly | Glu | Lys | Phe | Arg | Lys | Tyr | Ile | Ile | Gln | Leu | Phe | Lys |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Xaa | Xaa | Xaa | Gly | Leu | Phe | Val | Ile | Cys | Gln | Tyr | Cys | Gly | Leu | Leu | Gln |
|     |     |     | 325 |     |     |     |     |     | 330 |     |     |     |     |     | 335 |
| Ile | Tyr | Ser | Ala | Asp | Thr | Pro | Ser | Ser | Ser | Tyr | Thr | Gln | Ser | Thr | Met |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Asp | His | Asp | Leu | His | Asp | Ala | Leu |     |     |     |     |     |     |     |     |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     |     |     |     |     |

## (2) INFORMATION FOR SEQ ID NO:11:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 54 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Cys | Ser | Ser | His | Phe | Pro | Tyr | Ser | Gln | Tyr | Gln | Phe | Trp | Lys | Asn |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Phe | Gln | Thr | Leu | Lys | Ile | Val | Ile | Leu | Gly | Leu | Val | Leu | Pro | Leu | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Val | Met | Val | Ile | Cys | Tyr | Ser | Gly | Ile | Leu | Lys | Thr | Leu | Leu | Arg | Cys |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Arg | Asn | Glu | Lys | Lys | Arg |     |     |     |     |     |     |     |     |     |     |
|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

## (2) INFORMATION FOR SEQ ID NO:12:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 147 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

|            |            |            |            |            |            |     |
|------------|------------|------------|------------|------------|------------|-----|
| TTTCCATACA | GTCAGTATCA | ATTCTGGAAG | AATTTCCAGA | CATTAAAGAT | AGTCATCTTG | 60  |
| GGGCTGGTCC | TGCCGCTGCT | TGTCATGGTC | ATCTGCTACT | CGGGAATCCT | AAAAACTCTG | 120 |
| CTTCGGTGTC | GAAATGAGAA | GAAGAGG    |            |            |            | 147 |

## (2) INFORMATION FOR SEQ ID NO:13:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 34 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Phe Pro Tyr Ile Lys Asp Ser His Leu Gly Ala Gly Pro Ala Ala Ala  
 1 5 10 15  
 Cys His Gly His Leu Leu Leu Gly Asn Pro Lys Asn Ser Ala Ser Val  
 20 25 30  
 Ser Lys

## (2) INFORMATION FOR SEQ ID NO:14:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

TCGAGGATCC AAGATGGATT ATCAAGT

27

## (2) INFORMATION FOR SEQ ID NO:15:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 27 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

## (xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

CTGATCTAGA GCCATGTGCA CAACTCT

27

## (2) INFORMATION FOR SEQ ID NO:16:

## (i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

CCTGGCTGTC GTCCATGCTG

20

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 27 base pairs

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

CTGATCTAGA GCCATGTGCA CAACTCT

27

[illegible]